

Claim Amendments:

Please amend the Claims as follows:

1. (Currently Amended)      An injector system comprising:  
a powered injector;  
a pressurizing chamber in operative connection with the powered injector;  
a fluid path in fluid connection with the pressurizing chamber and a source of injection fluid for supplying to the pressurizing chamber; and  
a manual control device ~~in fluid connection with the fluid path~~ in operative connection with the powered injector, the manual control device comprising at least one actuator, the manual control device comprising a preprogrammed injection mode wherein depression of the actuator causes the powered injector to deliver a preprogrammed injection of injection fluid, and wherein the manual control device is adapted to stop an injection procedure if no force is applied to the actuator.

2. (Withdrawn)      The injector system of Claim 1 wherein the manual control comprises a chamber in fluid connection with the fluid path, the actuator comprises a button in operative connection with a piston disposed within the chamber, and the button is biased in an off position.

3. (Currently Amended)      The injector system of Claim 1 wherein the ~~at least one actuator controls the injector in~~ preprogrammed injection mode is a low high pressure mode.

4. (Currently Amended)      The injector system of Claim 3 ~~1~~ wherein the at least one actuator ~~provides control of~~ controls flow rate of injection fluid in the preprogrammed injection mode by changing the force thereon.

5. (Currently Amended)      The injector system of Claim 3 ~~1~~ wherein the fluid path is in fluid communication with a source of flushing fluid, and wherein the ~~manual control at least one actuator~~ further comprises a second actuator having an on state and an off state, the

~~second actuator causing the injector to enter into a preprogrammed high pressure injection mode when placed in the on state~~ controlling flow of flushing fluid in the fluid path.

6. (Currently Amended) The injector system of Claim 3 5 wherein the ~~manual control~~ at least one actuator further comprises a third actuator for controlling flow of saline flushing fluid in the fluid path.

7. (Withdrawn) The injector system of Claim 1, further comprising an audible feedback unit in operative connection with the at least one actuator, the audible feedback unit operable to provide audible feedback to the operator.

8. (Withdrawn) The injector system of Claim 1 wherein the manual control is adapted to be purged of air before injection.

9. (Withdrawn) The injector system of Claim 8 wherein the manual control comprises a purge valve.

10. (Withdrawn) An injection system for use in angiography, comprising:  
an injector in fluid connection with a source of injection fluid; and  
a pressure sensor in fluid connection with the injector via a pressure activated isolator adapted to isolate the pressure sensor from pressures in a fluid path above a set pressure, the pressure sensor being free to change elevation with a patient catheter in fluid connection with the injector.

11. (Currently Amended) An injection system for injecting an injection fluid into a patient, the system comprising:

a pressurizing device for supplying injection fluid under pressure;

a low pressure fluid delivery system; and

a pressure isolation mechanism having a first port adapted for connection to the pressurizing device, a second port adapted for connection to the patient, and a third port adapted for connection to the low pressure fluid delivery system, the pressure isolation mechanism

comprising a valve having a first state and a mutually exclusive second state, the first state occurring when the second and third ports are connected and the first and third ports are connected, and the second state occurring when the first and second ports are connected and the first and third ports are disconnected, the valve being normally biased to the first state and being switchable to the second state when fluid pressure from the ~~syringe pump~~ pressurizing device reaches a predetermined pressure level, the first and second ports being connected in both the first and second states of the valve.

12. (Original)            The system of Claim 11, further comprising a valve in line between the pressurizing device and the first port of the pressure isolation mechanism.

13. (Original)            The system of Claim 12 wherein the valve in line between the pressurizing device and the first port of the pressure isolation mechanism is an automated valve.

14. (Currently Amended)    The system of Claim 11 wherein the low pressure fluid delivery system comprises a source of flushing fluid, a drip chamber in fluid connection with the source of flushing fluid and a detector to sense the amount of flushing fluid in the source of flushing fluid.

15. (Original)            The system of Claim 14, further comprising a flushing fluid control valve and a bubble detector in line between the flushing fluid drip chamber and the pressure isolation mechanism.

16. (Original)            The system of Claim 15 wherein the pressurizing device is in fluid connection with a source of injection fluid via an injection fluid drip chamber, the system further comprising a detector to sense the amount of injection fluid in the source of injection fluid.

17. (Currently Amended) The system of Claim 16, further comprising an injection fluid control valve and ~~a~~ an air detector in line between the injection fluid drip chamber and the pressure isolation mechanism.

18. Cancelled.

19. (Currently Amended) ~~The system of Claim 18~~ An injection system for injecting an injection fluid into a patient, the system comprising:

a powered injector;

a pressurizing chamber in operative connection with the powered injector;

a fluid path in fluid connection with the pressurizing chamber and a source of injection fluid for supplying to the pressurizing chamber; and

~~wherein the~~ a handheld controller comprises comprising a first control having a first mode to control injection of injection fluid in a low pressure mode, the wherein flow rate of the injection fluid being is directly proportional to the distance the first control is depressed, and a second mode wherein depression of the first control causes the powered injector to deliver a preprogrammed injection of injection fluid.

20. (Currently Amended) The system of Claim 19 wherein ~~low pressure injection is ceased if the first control is released while in the first mode~~ is a low pressure mode.

21. (Currently Amended) The system of Claim 20 ~~19~~ wherein the ~~first control has a second mode to control injection of injection fluid in is a high pressure mode, the high pressure mode being ceased if the first control is released while in the second mode.~~

22. (Currently Amended) The system of Claim 21 ~~19~~ wherein the fluid path is in fluid communication with a source of flushing fluid, and the handheld controller further comprises at least a second control to control injection of the flushing fluid.

23. Cancelled.

24. (Original)        The system of Claim 11, further comprising a pressure transducer in fluid connection with the third port of the pressure isolation mechanism.

25. (Previously Presented)    An injection system, comprising:  
a source of flushing fluid;  
a pump in operative connection with the source of flushing fluid;  
a flushing fluid valve in operative connection via a first port thereof with an outlet of the pump;  
a first connector in fluid connection with a second port of the flushing fluid valve;  
a source of contrast;  
a contrast valve in operative connection with the source of contrast via a first port of the contrast valve;  
a powered injector in operative connection with a second port of the contrast valve;  
a second connector in operative connection with a third port of the contrast valve;  
a pressure isolation mechanism having a lumen including a first port in fluid connection with the second connector and a second port in fluid connection with a patient catheter, the pressure isolation mechanism also having a third port in fluid connection with the lumen and with the first connector, the pressure isolation mechanism comprising a valve having a first state and a second state, the first state occurring when the lumen and the third port are connected, the second state occurring when the lumen and the third port are disconnected, the first port and the second port of the lumen being connected in the first state and in the second state, the valve being normally biased to the first state and being switchable to the second state when fluid pressure in the lumen from the powered injector reaches a predetermined pressure level; and  
a pressure transducer in fluid connection with the third port of the pressure isolation mechanism.

26. (Previously Presented) The system of Claim 25, further comprising a first air detector in fluid connection between the flushing fluid valve and the first connector and a second air detector in fluid connection between the contrast valve and the second connector.

27. (Previously Presented) The system of Claim 25, further comprising a first drip chamber in fluid connection between the source of flushing fluid and the pump and a detector in operative connection with the first drip chamber to sense the amount of flushing fluid in the source of flushing fluid.

28. (Original) The system of Claim 27, further comprising a second drip chamber in fluid connection between the source of contrast and the contrast valve and a detector in operative connection with the second drip chamber to sense the amount of injection fluid in the source of injection fluid.

29. (Original) The system of Claim 25, further comprising a handheld controller to control injection of injection fluid and injection of flushing fluid.

30. (Withdrawn) The system of Claim 29, further comprising a foot controller to control injection of at least one of injection fluid and injection of flushing fluid.

31. (Currently Amended) A fluid path set for use in a fluid delivery system, comprising:

a multi-patient use section adapted for connection to a pump device and to a source of injection fluid; and

a per-patient use section adapted for removable fluid communication with the multi-patient use section, the per-patient use section comprising a pressure isolation mechanism comprising a first port adapted for connection to the pump device via the multi-patient use section, a second port for connection to the patient, and a pressure isolation port adapted for connection to a source of medical fluid via the multi-patient use section, a lumen connecting the first port and second port, ~~pressure isolation port,~~ and a valve member biased to a normally open position permitting fluid communication between the lumen and the pressure isolation port, and

movable to a closed position when fluid pressure in the lumen reaches a predetermined pressure level sufficient to overcome the biasing force applied to the valve member.

32. (Currently Amended) The fluid path set of Claim 31 wherein the multi-patient use section further comprises a ~~stepped~~ multi-position valve adapted to selectively isolate the pump device, the source of the injection fluid, and the per-patient use section.

33. (Previously Presented) The fluid path set of Claim 31 wherein the multi-patient use section further comprises an intervening drip chamber between the source of the injection fluid and the pump device.

34. (Previously Presented) The fluid path set of Claim 31, further comprising a pressure transducer associated with the pressure isolation port.

35. (Previously Presented) The fluid path set of Claim 31 wherein the valve member comprises a biased piston.

36. (Previously Presented) The fluid path set of Claim 35 wherein the biased piston comprises a spring-biased piston.

37. Cancelled.

38. Cancelled.

39. (Currently Amended) The fluid path set of Claim ~~38~~ 31 wherein the multi-patient use section further comprises an intervening drip chamber between the source of the medical fluid and the pressure isolation port.

40. (Withdrawn) A pressure isolation mechanism, comprising:  
a housing defining a lumen and a pressure isolation port; and

a valve member disposed within the housing, the valve member biased to a normally open position permitting fluid communication between the lumen and the pressure isolation port, and movable to a closed position when fluid pressure in the lumen reaches a predetermined pressure level sufficient to overcome the biasing force applied to the valve member.

41. (Withdrawn) The pressure isolation mechanism of Claim 40, further comprising a pressure transducer associated with the pressure isolation port.

42. (Withdrawn) The pressure isolation mechanism of Claim 40 wherein the valve member comprises a biased piston.

43. (Withdrawn) The pressure isolation mechanism of Claim 42 wherein the biased piston comprises a spring-biased piston.

44. (Withdrawn) The pressure isolation mechanism of Claim 40 wherein the housing comprises a two-piece housing.

45. (Previously Presented) The fluid path set of Claim 31 wherein the pump device comprises a syringe or a peristaltic pump.

46. (Withdrawn) The injector system of Claim 1 wherein the at least one actuator is adapted to control the injector through application of force by an operator, the at least one actuator providing tactile feedback of pressure in the fluid path to the operator via fluid connection with the fluid path.

47. (New) The injector system of Claim 1 wherein the manual control device is in operative connection with a fluid control module which is operatively connected to the powered injector.



48. (New) The injector system of claim 47 wherein the fluid control module comprises an automated valve adapted to stop flow of injection fluid at any pressure and flow rate when no force is applied to the actuator to deliver a sharp bolus of injection fluid.

49. (New) The injector system of claim 1 further comprising an automated valve associated with the fluid path and adapted to stop flow of injection fluid at any pressure and flow rate when no force is applied to the actuator to deliver a sharp bolus of injection fluid.

50. (New) The system of Claim 1 wherein the actuator comprises a piston disposed within a chamber, and the piston is biased to an off position .

51. (New) The system of Claim 19 wherein the first control comprises a piston disposed within a chamber, and the piston is biased to an off position.

52. (New) The system of Claim 19 wherein the first control controls flow rate in the first mode by changing the force thereon.

53. (New) The system of Claim 19 wherein the handheld controller is in operative connection with a fluid control module which is operatively connected to the powered injector.

54. (New) The system of claim 53 wherein the fluid control module comprises an automated valve adapted to stop flow of injection fluid at any pressure and flow rate when no force is applied to the first control to deliver a sharp bolus of injection fluid.

55. (New) The system of claim 19 further comprising an automated valve associated with the fluid path and adapted to stop flow of injection fluid at any pressure and flow rate when no force is applied to the first control to deliver a sharp bolus of injection fluid.